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ABSTRACT

This paper addresses issues in integrating higher order thinking into the general curriculum. Data are based on a series of telephone interviews conducted in April and May 1992 with six leading thinkers in educational reform. They included: (1) Michael Apple, John Bascom Professor of Curriculum, Instruction, and Educational Policy Studies at the University of Wisconsin, Madison; (2) Sharon Johnson, teacher-leader at Horizon High School (Alamo District, Colorado); (3) Gaea Leinhardt, senior scientist at the Learning Research and Development Center at the University of Pittsburgh; (4) Dan Liston, associate professor at the University of Colorado, Boulder; (5) Fred Newmann, professor of curriculum and instruction at the University of Wisconsin, Madison; and (6) Ted Sizer, director of the Coalition of Essential Schools. The participants discussed problems in defining "higher order thinking" and policy implications. Two models of higher order thinking were briefly described: the Re:Learning program at Capital High School in Santa Fe, New Mexico, and an innovative program at Horizon High School in Thornton, Colorado. Participants concluded that higher order thinking should be more than just a set of skills and that reform programs should provide opportunities for students to apply their knowledge to the real world. Higher order thinking classrooms may not look much different from traditional classrooms. However, reform must change not only procedures, but the depth of conversations in classrooms. Finally, educators must not ignore the issue of replicating inequalities in the classroom. (LMI)

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Helping Kids to Probe and Ponder: Integrating Higher Order Thinking into the General Curriculum

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Commissioned by the University of Colorado Curriculum Reform Project

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Introduction

This paper was commissioned by the University of Colorado as part of the Curriculum Reform Project which began in October, 1991, with support from the Office of Educational Research and Improvement of the the U. S. Department of Education. The project addresses science, mathematics and higher order thinking across the curriculum.

Research for the paper consisted of a series of telephone interviews with some leading thinkers in the field of educational reform conducted in April and May, 1992. The interviews were based on a series of questions provided to the subjects before the telephone calls occurred. These, in turn, led to other questions, and the interviews turned into conversations around the central idea of integrating higher order thinking into the general curriculum. The questions around which the conversation turned involved, first, defining higher order thinking and trying to determine why it is called "higher order." That called for deciding if there is a connection between "higher order" thinking and the so-called higher levels in Bloom's Taxonomy. Also of interest were how curricula and classroom practice would look and what pedagogical skills would be used if teachers were integrating higher order thinking. This led to asking the interviewees to envision how classrooms might be different if teachers were working on problem solving and on developing critical thinking if, indeed, there would be difference from more traditional classrooms. Finally each of the interviewees was asked to describe policy changes which he or she thought might be necessary in order to create a climate conducive to the integration of higher order thinking into school curricula.

The first of the educators interviewed is Michael Apple, John Bascom Professor of Curriculum, Instruction and Educational Policy Studies at the University of Wisconsin, Madison. Dr. Apple has a special interest in the relationship between tradition and differential power. He explains, "I'm interested in whose knowledge is taught, whose pedagogy dominates and what forms of evaluation go on, and the question arising from that becomes, 'Who benefits from it?' "

Sharon Johnson is a teacher-leader in an interdisciplinary, integrated program with a focus on science at Horizon High School in Colorado's Alamo 12 School District located near Denver.She is a practitioner in the field and works at achieving higher order thinking in her classroom. Her school is in the process of restructuring and integrating curriculum across several disciplines.

Gaea Leinhardt is a senior scientist at the Learning Research and Development Center at the University of Pittsburgh and director of a program on expertise in teaching. She describes her field of interest and specialty as anthropo/cognopsychological, and she has worked recently in the mathematics and history disciplines

Dan Liston is Associate Professor in the School of Education at the University of Colorado, Boulder, and co-author of Teacher Education and the Social Conditions of Schooling. Dr. Liston, who works as an educator and teacher of teachers, describes his book as an attempt to broaden the basis of teacher education to encourage examination of the social and political implications of education, which is also his special interest as an educator.

Fred Newmann is Professor of Curriculum and Instruction at the University of Wisconsin, Madison, and director of the Center on Organizational Change and Restructuring Schools. Dr. Newmann's work on higher order thinking has spanned his whole career. He is the author of numerous articles and books on education and in particular on higher order thinking.

Ted Sizer is director of the Coalition of Essential Schools, headquartered at Brown University and author of Horace's Compromise and Horace's School, both of which have been widely read by educators around the country. The books have provoked interest in school restructuring based on what Dr. Sizer and his associates have identified as nine common attributes of good schools. The first of these attributes, known as the Nine Common Principles, is an emphasis on helping all students to learn to use their minds well.

Higher Order Thinking Defined

In response to a request for definition of higher order thinking, Sizer says, "That's the brass ring question. Higher order thinking is kids being able to deal with abstractions, and to deal with ambiguity -- to make leaps, deductive or intuitive. Higher order thinking is speculative as well as analytic."

Newmann believes that higher order thinking occurs "when a person interprets, analyzes, evaluates, synthesizes and organizes information because the problem to be solved or the question to be answered cannot be handled by routine retrieval or algorithmic applications of previously acquired information. . . It all depends on whether there is some organization or manipulation of information as opposed to algorithmic reproduction of information. That's the critical distinction, and that's what distinguishes higher order thinking from lower order thinking. Lower order thinking is when the cognitive task is primarily to retrieve or reproduce previously acquired information."

Others agree, if not in the same words. Liston describes it as "getting beyond the surface to assumptions underlying the basic," explaining that it looks at themes and encourages interrogating further. That interrogation leads two ways -- into the text and into the world. Apple concurs with that need to look into the world. He worries that thinking just for the sake of thinking, thinking simply as a process, is not enough. "I must admit I don't care whether kids are thinking higher order if they're thinking about vacuous stuff, so unless higher order thinking is connected to what I call 'critical literacy,' that is focus on compelling social problems, I think it is basically a waste of time," he explains.

Leinhardt sees interpretation, transformation, and the generation of multiple-possibility questions as some of the procedures which help to make up what is called higher order thinking. In math, she says, higher order thinking is pattern recognition. She stresses that she believes that thinking and reasoning must be imbedded in a discipline. They are different for different disciplines, "Thinking deeply and critically in math is not the same as thinking deeply and

critically in history," she continues, adding that one needs to ask students to think about the notion of structures, intellectual themes, perspectives and the realization that more than one perspective is better. Explaining that reasoning as described in some of the literature "can be superficial," she nevertheless believes that thinking about meanings and outcomes, synthesizing, and reasoning through, are a part of what teachers should expect of students. "There is no meaningful action in asking people to use higher order thinking in an isolated way. We need to ask people to ask questions and answer them analytically and carefully."

Liston also sees questioning as essential to good thinking. "Higher order thinking is not simply problem solving; it is also problem posing," he says. Coalition schools in Sizer's fold structure curricula around essential questions, often asking students to help form those questions designed to go to the heart of the disciplines and to remain provocative and open-ended. As to the nature of a classroom in which higher order thinking was present, Sizer described it as "a classroom full of questions."

While there was a consensus that higher order thinking is a desirable goal, several of the subjects of the interviews express reservations about its being oversimplified and taught as an addition to existing curricula. Both Liston and Apple, for example, voice concern that the term might be a kind of slogan or perhaps a pat answer to bigger problems. Apple says, "I tend to think of it as a slogan that psychologizes what is a serious social problem, that is it tends to say something like this. 'Following Bloom's taxonomy, in some ways there's low level stuff going on in schools; therefore, if we could get higher level stuff, synthesis, evaluation, etc. going on in schools, then we'd be fine.' I think that that transforms a larger social question into a psychological one that can be solved simply by raising the level of discourse in classrooms. I think that's horribly naive, actually, which doesn't say that is a bad idea, but by itself, I think it's utterly simplistic."

The various people interviewed are not apparently as much divided on the value of raising the level of discourse in a classroom, as some of them are skeptical about the possibility of there becoming such a thing as a class in "higher order thinking" that primarily teaches skills

and doesn't really ask students to probe deeply and to always be rethinking, reformulating and readjusting in response to further knowledge or understanding. The reservations about the topic under discussion always took that tone--the notion that teaching higher order thinking is not a skill-based task, but rather one that calls for some other dimensions, namely in-depth knowledge and a disposition toward certain temperamental qualities such as patience, tolerance of ambiguity and an interest in reasoning. The dispositions of thoughtfulness, according to Newmann, are crucial to the intelligent use of either the knowledge or the skills of higher order thinking, although they are perhaps the least discussed. "The third thing(in addition to in-depth knowledge and certain intellectual skills) is you need these temperamental qualities. . . There are a variety of dispositional qualities that are necessary if you're going to do a good job of higher-order thinking. One of the things we've observed is that we think there's a danger that if you focus on just higher order skills in your instruction, you will neglect these other two dimensions, in-depth knowledge and dispositions, and many programs, I think, make this mistake in that they equate higher order thinking with higher order skills and all they do is teach a bunch of skills that are often devoid of content and don't respond to the disposition problem."

The quarrel, if there is a quarrel, is with the notion that Higher Order Thinking, in capital letters, might become a new panacea for the ills of the world, taught in a piecemeal fashion as a set of skills with which students may attack the job of thinking. It should, if it is really valuable, seek ways to apply the thinking to real world problems. Students must be enabled to learn from a constructivist approach, using the prior conceptions and the new knowledge to construct their own meaning. The very act of making meaning from all the new knowledge and skills without the instructor's telling them what they should think constitutes higher order thinking. Several of the people interviewed also express a concern that it should go a step beyond to the application of that personal meaning toward real problems in society.

Higher Order Thinking and Bloom's Taxonomy

The notion of "raising" the level of discourse, of using "higher" order processes and indeed the notion that there is a hierarchy calls up for many educators memories of teacher training days when everyone studied Bloom's Taxonomy. No one interviewed denied that Bloom's provided some of the language which is used to describe those processes. Liston says of Bloom's, "Some things just last....one nice thing about Bloom's is that even at second grade we can ask kids to evaluate and synthesize, although it is important to be sensitive to age levels." For Sizer, "the upper edges of the hierarchy there [in Bloom's] are the kinds of analysis and use of inference" [around which the discussion had focused]. Johnson says that the higher levels on the Bloom's Taxonomy are those which are the goal of the integrated program in which she teaches.

Conversely, Newmann sees an inherent weakness in the taxonomy if one applies it out of context. "My only quarrel with Bloom's has to do with whether you can predict whether any given task provides higher order or lower order thinking for most people. So, for example, if you ask somebody, 'What are the causes of the Civil War?' it's impossible to determine from that question whether it's going to involve higher order or lower order thinking until you know the context in which the question is given. So if a kid has been told to memorize five causes of the Civil War, and the next day he's asked what caused the Civil War, then that's lower order thinking. If a kid has been presented with a complex essay that never even really mentions the causes of the Civil War, but has all kinds of information in there that's relevant to that and then is asked that question and the kid has to synthesize and interpret, then that would be a very higher order task. So I think I don't necessarily have a quarrel with Bloom's Taxonomy, but I do think one consequence of the taxonomy is people will sort of stipulate that certain tasks are necessarily lower and others are higher, and we think it all has to be put in the context of an individual experience."

Leinhardt says that the taxonomy has value as long as people remember that some critical knowledge bases were missing when it was formulated. Set in time, in 1948 in the midst of the influx of returning GI's using the GI bill to go to school, "it's more understandable," she says. Vets beginning school later in their lives had "good horse sense, but not much knowledge. The schools were facing a problem of off-generational thinking." She likens the formulaic use of Bloom's to evaluate particular classroom practices to the use of the standard five paragraph essay with the hypothesis preferably in the first paragraph if not the first sentence. Either can be "like just mindless drilling," although she doesn't think it's so bad to learn forms as long as they are known to be forms. Instead of defining how to teach higher order thinking as skills, she believes we should ask teacher to define the deep and critical issues. "I ask teachers to do that all the way down, K - 12."

The definition of the lasting, critical issues within a discipline and across disciplines as teachers plan together to design curricula which encourage their students to make connections, to construct their personal meaning, is the element which makes higher order thinking happen. "In order for higher order thinking to occur," says Liston, "we as teachers have to give some thought to what we believe the curriculum should look like. We need to ask, 'After a year in my class, what do I want these students to look like?' " Higher order thinking happens, not because teachers teach kids how to do it, but because teachers are able to raise issues so vital, so thought-provoking, and so connected to the real world, that kids are challenged to make meaning from them and to find out what they need to know beyond what is presented by the teacher.

Curricula and Pedagogy and Higher Order Thinking

In a classroom in which higher order thinking is a goal, the old paradigm of the teacher talking and the students being told what to think will be deemphasized. Together the students and their teachers will work as teams. The pedagogy of questions described by Sizer would "not

be a pedagogy of telling people, telling the kids of other people's answers to other people's questions. It would be far more driven by the hope that kids would get in the habit of asking questions."

Explaining that he has difficulty talking about any kind of thinking apart from examples, Sizer describes several teachers who are successful at getting kids to ask the questions. "My wife is a high school teacher, and she's been very effective by giving kids documents. Instead of saying, 'We're going to look at the rise in homelessness,' she gives them a bunch of statements and data - what's happened to jobs, what's happened to real income of families, a bunch of things, and then essentially she says, 'What does this add up to?' The kids say, "Well, I don't know. What does this add up to?' " He pauses to let the interviewer draw a conclusion.

"Or another teacher, one I admire very much," he continues. "She's collected a whole bunch of stuff from the 1860's, did a lot of xeroxing, books and stuff, handbills, posters, a whole bunch of stuff. She dumps it on the desk and says, 'Make sense out of it.' The kids have to start looking at evidence and get in the habit of looking at evidence and practicing synthesis, and they fumble terribly at first, just as they might in a science class where [they] are asked to bring in little bottles of water collected from puddles, standing water. And then the teacher asks, 'Is that water?' 'Yeah, that's water,' and they put it under the microscope and see what's there or not as the case may be. 'What is it that makes the samples water?' and then they ask, 'What was it about your puddle that is different from some other kid's puddle? Look, you have different living things in yours than she has in hers, and yet they're both plain old water.' "

Again Sizer pauses to let the interviewer ask a question, "And then the kids will ask, 'Well, are they plain old water?' "

"Right!" he affirms, having practiced exactly what he advocates.

Apple, for whom critical literacy is a bottom line, described a school to illustrate his point that higher order thinking should result in some action focused on a compelling social issue. "A school that I find very interesting is the Rindge School of Technical Arts in Cambridge, Massachusetts. Now this is a vocational-technical high school. It is largely black and Hispanic.

The school had a very high dropout rate and they first tried to do this stuff called higher order thinking which urges, 'Now let's see if we can get better discourse, better strategies around the same old material.' That failed. Rindge still had a horribly high dropout rate, etc., and quite an alienated student body, although a group of really committed teachers and administrators. What they have done now is to reorganize the entire curriculum so that the majority of the students, both academic and technical, [work] around some pressing social problem that the students identify. After democratic deliberation, students identified one project that they wanted to work on and integrate curriculum areas together on, and that was the horrible downturn in housing for the elderly and poor people in parts of Boston. So they [students and teachers] have jointly formed curricular and technical stuff that focuses on building homes, housing, for the elderly and poor people in that area. They are studying and reading about those kinds of things and the process that is going on has become quite sophisticated. The debates are quite sophisticated, so again if we were using this taxonomy, it would be well above memory and recall. It's organized around finding out what they should read, not only technically about how you build houses, but also about the issues of homelessness.....and again there's the definition of critical literacy. They're very critical and committed about certain social problems, and it's actually it's a form of social criticism that says, 'This society needs to be heard.' Actually it's that combination of a pressing social problem, serious in the eyes of students, combined with the kind of discourse and purpose in the schools, that's much more interactive. It's that kind of stuff that I respond to very well," Apple explains.

Using a hypothetical situation to explain his vision of curriculum and classroom practice that would lead to higher order thinking, Newmann says, "Well, sort of obviously, if we take social studies and use our scheme, the content of the curriculum would be first of all, some sort of in-depth understanding of what one is studying and the posing of problems that require organization and interpretation of information rather than just the traditional survey course where you're supposed to regurgitate the information. You would deal with a particular problem or issue. If it happened to be, 'Why did we have a Civil War in this country?' that would be one

question that you could focus on and in the process of studying that, you would use a lot of different information that the kids would have to analyze, and in the process of using that information, you'd probably have to teach them some specific skills, evaluation of evidence and reliability of sources and that sort of stuff. You'd also, as a teacher, try to model some of the dispositional qualities that one needs to deal with higher order challenges which are often ill-structured problems that don't have a right answer. You'd have to figure out some ways of giving kids support for their reasoning process rather than just for coming up with the right answer, showing them that there are lots of alternative ways to look at the problem and be comfortable with that degree of flexibility and ambiguity."

Apple divides knowledge into three categories. "Analytically we can differentiate, only analytically, between three kinds of knowledge--knowledge ***that,*** which is the facts; knowledge ***how*** , which is skills (I know how to solve the quadratic equation or to ask a good question), and what's called knowledge ***to***, which is the dispositions of knowledge. . . .So the pedagogic skills are also pedagogic values, certain committments that are crucial -- a commitment toward expanding democracy, a commitment toward essentialized power relations, a commitment toward taking risks with students; and with parents because when you're doing different things and there is a horrible downturn in the economy, many parents are going to say, 'Why are you doing this if it's not on the test?' It's those kinds of things I think we have to talk about as well as the so-called psychological skill-based type of things."

Leinhardt, who described the term *higher order skills* as an oxymoron, also expressed respect for risk-taking, citing an example of a teacher of art and music who "snuck in" a modern dance, symbolizing the idea that teachers like this are thinking about the front edges of their disciplines. "Their own enthusiasm and risk is the key to getting kids to also look at those leading edges," she says. Disposition, especially that of the teacher, is a crucial factor for Leinhardt as well. She describes a successful attitude as one of, "I love this stuff! Come love it with me!" constrasting that with one of, "I'm here to tell you how to do this." The teacher as a coach, which is also one of the Sizer group's Nine Common Principles, is a metaphor that Leinhardt says she

likes. The teacher also needs to help the students understand that a goal for the student is to function as the working partner in the classroom. Leinhardt says the teacher's role "is to detect the nuances of the beginning of the lesson, present those and let the kids grapple with the learning and find the end, even if it means finding some dead ends."

The quality of the conversation in the classroom is a concern for everyone interviewed. Newman identifies "learning how to have a conversation with a kid in which you're helping the kid to organize and reflect on information" as a major teaching skill. "That's probably the major issue, how teachers can learn to have conversations with kids that give them that sort of autonomy to think and yet also challenge them to be rigorous in their thinking. Most of the talk in classrooms is not a conversation. Most of it is the teacher trying to get the kid to say what the teacher has already figured out that he wants him to say. So I'd say learning how to have discussions, real discussions, is probably the major pedagogical challenge."

Sizer concurs, citing Newmann as a source for some of his thinking about the nature of discourse. "[Newmann] has found, and they've studied this very carefully at the higher order thinking project at the research center, and what he has identified as a crucial element of the quality of conversation among the kids and the teacher, that is how the teacher models the expression of ideas really sets the framework for kids' learning how to do the same thing. The way teachers talk is very important; the quality of the conversation in the classroom is very important. I've found that a very interesting finding. There are various things that Newmann has written about the quality of conversation, that hadn't occurred to me at first. . . . I think we can all remember a handful of classrooms when we were in high school which were quite memorable, and when I first thought of this, I remembered those teachers that took us seriously and treated us like grownups. What that was was a pretty high level of discourse. I mean the dealing with abstractions, the dealing with questions, the posing of questions, which is really quite flattering."

He goes on to describe a study showing that low-income children entering first grade achieved low scores and struggled because of language limitations. "Well, a very smart person went out and got low income mothers together and persuaded them to change the way they

talked to their kids, trained them how to talk to their children using a wider vocabulary, richer grammar. As a matter of fact, the kids developed an ear for richer language, more complicated language, a richer vocabulary, and presto, those kids did much better in first grade. It's so elegantly simple." The implication was that teachers could do the same thing for students on any level by having high expectations and maintaining conversation at a level that reflects those expectations.

Leinhardt agrees that high expectations are important. While she is not sure that she agrees with the "liberal party line" which would eliminate tracking completely, she does state that the real issue is that if tracking exists, all classes should be advanced placement level classes, in that all students should be asked to "fuss" with the complicated texts. "Instead, she believes, "we rely on abbreviated versions of Romeo and Juliet and the Trojan Wars because we need to cover this and that." She cites history as an example, pointing to the crucial and important differences between AP and all the other classes. The differences are "quite stunning" and she says they should not be. "On the one hand the teacher gives an outline, and the teaching is designed to remove the idea that it's too hard. For the test, the students get a purple sheet and they review, led by the teacher and fill in the outline to study to take a true-false, multiple choice test. In AP there is oodles of stuff to read. For example why is Hamilton's philosophy different from Jefferson's. They learn to consider point of view, to look at who's thinking here, who's speaking, from whose eyes do we see it?"

Such habits of mind are also prevalent in another school which Apple used to make the point that his notion of critical literacy must be relevant to students' lives. He describes Central Park East School in New York, where he says the first question that is asked of every curricular area is, "From whose perspective are we seeing, listening, arguing?"

"Now that makes sense" says Apple. "The idea is you constantly say, 'Whose knowledge is this?' It's not saying it's wrong. It's asking me to reflect on from whose perspective am I seeing this world and do I agree with it or disagree with it? And then and only then can it be connected to their biographies. Otherwise we're simply giving kids stuff to feed back on tests.

And folks who think about higher order thinking stuff are totally opposed to that, and to that extent we certainly agree. There is also an attempt to link the knowledge that is taught to the personal biography of the students so that it's not random, but disciplined and connected to the life of living in a city. Mathematics is linked to specific problems that they may daily face. It gets quite sophisticated, but it's applied to problems that are generated for them. That's very wise. Part of the curriculum is negotiated; it's not received, so kids are deeply involved. . . .but it's not random; it's guided. This is not a formula for anarchism. They always know where they ought to go with some help by the people called teachers, so in general, that looks very different from the kind of stuff that might go on in an ordinary middle school. And, we intuitively understand that it's different, much more critical, has a different kind of discourse and different roles for teachers and students, and the teacher is always in control."

Classroom Differences

For Newman, the appearance of a classroom where higher order thinking is occurring might not necessarily be radically different. In describing the social studies classrooms and departments he and colleagues at the Center on Organizational Change and Restructuring Schools observed in a study to determine qualities that make them classrooms where higher order thinking is promoted, he found them "not that visibly different." He explains, "I think one mistake we make is that we assume that there has to be some real radical shift in what we're doing. You wouldn't see kids just listening to a teacher talk, and in that sense there has to be a radical shift, but kids would be reading, kids would be writing, kids would be talking with one another, they would be talking with the teacher. There would be occasions when they would all be sitting, listening to the teacher, or they would be having a class discussion.

" I think one of the mistakes is that we focus too much on the structure of how the classroom would change before the teachers understand intellectually what's supposed to happen. I mean we've seen so many examples of teachers just doing mindless small group work

because they think they're supposed to change what the kids do, which they do, but the teachers don't understand the intellectual purpose of that. I would rather see a teacher who understood the intellectual purpose and kept the kids in a large group and just had good large group discussion, but knew what the intellectual agenda really was, as opposed to a teacher who decided, 'Okay, I'll let the kids loose,' and they'll go all out in small groups, and yet the teacher doesn't really understand what it means to study something in depth. I think you've got to be really careful that the technique doesn't dominate what you're all about and it's the intellectual work that's most important. You want to consider the technique after you've figured that out."

Leinhardt also expresses concern that many of the education reform efforts are devoted to seminars with groups of people discussing retooling of procedures. She suggests that perhaps there is not enough emphasis on working together in groups to consider their content and disciplines, that too much time is spent on strategies as to how a school or district could restructure and not enough on thinking and looking at the critical issues within the discipline. She also questions too much use of small groups in the classroom, explaining that the challenge is to "keep the depth and challenge within the course and give help-help-help." For her it is crucial that the teacher not cave in to the mediocre.

For Liston, too, it is important to look closely and ask hard questions of some of the reform efforts. In particular he mentioned a move in Boulder, Colorado, where he lives, to change from junior high schools to middle schools. Stressing the need to maintain intellectual rigor, his questions is the same questions that parents ask across the country: "Are they diminishing the skills and knowledge kids are going to need?" But as an educator, he would add, "Are all of the students receiving a quality education?"

It is the responsibility of schools, districts, statewide efforts and agencies, and the national restructuring efforts to see that this kind of question is answered. Community involvement and public relations are important components of any successful change movement. There is beginning to be a body of data which supports the value of high expectations, high levels

of discourse and higher order thinking for all students. It is crucial that it be used to answer the questions of critics across the country.

Among those asking the hard questions are many in positions which empower them to help make policy decisions regarding the future of education in our country. A number of the issues raised by the subjects of the interviews deal with a need for shifting paradigms in policy arenas. Sizer suggests one means of helping change some of those old ideas about how schools should be. He says that we must "drag people into schools. Two ways to radicalize policy makers are, first to have them shadow a kid in school for a day, and that will radicalize them if they have to sit still that much and be talked at that much. The other is to show them the test, the scores of which they make so much of and which they think really tell you what you need to know. A lot of people that make a lot of test scores have never looked at a test, and if they did, they'd see that standards of those tests are misdirected."

Policy Implications

Both of the issues raised in Sizer's suggestion about the radicalization of policy makers were also raised by various of the other people interviewed. Both assessment and the fragmentation of the high school day were named by some as constraints to the integration of higher order thinking into the curriculum. Other included the terrific demands that both society and the administrative requirements of schools place on teachers in terms of time and fragmentation of their skills and intellectual focus. Also mentioned was a need for change in the training of teachers at both pre-service and in-service levels.

Sizer is particularly concerned with the necessity of changing the type of assessment instruments used as well as the confidence the public places in the results of tests which measure only the students' ability to memorize and feed back answers on a recall/comprehension level. "If the tests on which so much of this rests are the tests of lower order thinking or rote

memory or very little use of language, no one expecting a rich conversation, then teachers who try to make their classrooms rich in conversation and full of questions" are not necessarily rewarded. Although Sizer says that students in coalition schools still do well on such tests, he feels it is in part "a backhanded thing. Kids at coalition schools tend to show up more and they're in the habit of thinking so they do better because they can figure things out. Wouldn't it be nice, if the incentives that the policy makers set were ones that rewarded higher order thinking?" Liston, too, sees the present curriculum as "too much test and assessment driven."

Sizer goes on to describe exams in Australia where he has been a teacher. "There the external exams are essays...and when a kid has to write something about the causes of the Spanish American War, and then you have to give the kid 45 minutes rather than 4.9 seconds to pick one out of five multiple choice answers, what that does, of course, is signal the kid, 'I have to know something , some important things, to be able to express them.' It also builds into our teachers, expectations that they have to give the kids some practice in that kind of serious thought." Coalition schools work toward exhibition of mastery, performance-based assessment that lets students demonstrate their understanding in multi-facted ways.

Also stressed by both Sizer and Newmann as areas where policy could be changed are the issues of the schedule and the push for coverage of prescribed amounts of material. "Another constraint," says Sizer 'is the way we carve up the day....Really deep and imaginative thinking rarely flourishes in a 44 minute period. A typical high school is fiendishly set up to deny much serious thought. The time constraints are short and the subjects change so fast." He also pointed out that typically there is very little connection between the subjects.

"Related to the chopped up day is the amount of coverage there is. Nothing could be more absurd than a world history course where, if you drop your pencil, you miss a whole decade. You can't have the kind of discourse, the kind of conversation that gets people into thinking if you're trying to get to Cleopatra by Friday. So it's a combination of a simpler, more orderly day and a more demanding and narrower curriculum."

Newmann agrees. "One thing dealing with policy has to do with reducing the policy aimed at coverage in the curriculum, because to the extent that you have to race through all this stuff, you can't be reflective about anything. I would agree with Ted Sizer that less is more (another of the Nine Common Principles). That has implications for testing, curriculum guidelines and possibly course requirements. Another implication is that teachers are really ill-prepared for this and you're going to need a lot of staff development support, which means you're going to need release time for teachers and opportunities to work colleagially with one another," says Newmann.

Apple sees visits to other schools where exciting things are happening as one way to help teachers learn how to accomplish some of the goals of reform. He explains, "Teachers should have about seven days a year -- well, one week -- when they see or hear things that are crucial to doing the kinds of things I'm talking about. Reading it isn't the same as watching it. One of the things that should be required is the ability to return to some of the things that teachers had before: the ability to say, 'Listen, Michael, I hear you're doing really interesting things in your school. I want to spend three days watching it,' rather than the normal in-service. That may seem like a very simple thing, but I mean it as a metaphor for larger things. In order for this classroom to be different from what we normally see, we need to give people a concrete experience that's different from a one-afternoon, once-a-month, meeting, sitting and listening to a sermon on discipline practice or one on Madeline Hunterizing the world." Apple calls for a policy change that would do away with the in-service model that comes from the top down. "We need time for teachers to share, cooperate and to see what's really going on with folks who are just like them. . . It seems like a simple thing, but that requires major budgetary changes, and it requires, certainly, a different way of thinking about in-service and its benefits.

Several of the educators mention changes in the way teachers are trained as a part of what needs to happen. Newmann makes the point that it is not simply a question of what future teachers learn in the schools of teacher education. "It's also a question of how teachers experience their own undergraduate education in the disciplines," he explains.

Other policy implications fall into the broad categories of the demands on teachers' time, the imposition on the schools of other jobs by the society they serve, and the subsequent intellectual drain Apple calls "de-skilling," which occurs for teachers who are expected to wear so many hats. These categories are not discrete, but rather feed on one another in a "catch-22" sort of way.

"As we impose more stuff for schools to do," says Apple, "there is almost no time to breathe for teachers. When I was working with teachers writing a book, one of them said, 'Michael, I don't have time to teach.' And my memory of teaching in the inner city is exactly that, and it's gotten much worse, so the kinds of skills that teachers develop over long years of struggles, the ability to choose their own material, to build materials themselves, to act with students in a way that focuses on kids' individual needs--those are skills that took years to develop. Now, given what I call 'intensification' -- there is so much to do and no time to do it, teachers by and large are faced with a process of not having time to do more than at the end of the year perhaps settle on what textbook they'll use."

Apple says he agrees with Sizer that teachers must compromise in order to survive in the system. "I agree with Ted on that, except that I want to put gender into it. I want to say that we tend to blame women whenever society has a heart attack and we cut their resources at the same time." He explains that in his recent book, Teachers and Texts, an analysis of the labor process of teaching, one of the arguments is that teachers are becoming deskilled. "That is if we think of teaching largely as women's paid work, that is if you think again how teaching transformed over the last hundred years and became women's paid work, there have constantly been attacks on its autonomy, on its pay, on seeing teachers as skilled. That happens in every occupation that is dominated by women. That's unfortunate, but in a time of crisis, we are blaming just about every social problem on the schools."

Leinhardt and Liston also focused on the demands made on teachers. Leinhardt says she is "appalled at the work load asked of teachers." Liston sees the number of students many teacher in secondary schools have as a constraint. "You have to run from one class, one set of

materials to another. Meeting 180 kids a day doesn't allow optimum conditions for higher order thinking. It mostly becomes just meeting demands right then and there."

"For teachers the mechanics of their lives drive out the thinking deeply and becoming higher order thinkers through doing that kind of thinking," says Leinhardt. She believes there needs to be policy that recognizes special talents and thinking, mentioning specifically an incident in which in trying to find teachers who were using a certain type of poem, she found some elementary teachers who were themselves "poets in the classroom." She described two advanced placement teachers, one who operated from a personal space, and one who was anchored to her discipline. They were equally successful, says Leinhardt, "which brings us to the idea of honoring teaching styles. We all remember the traditional, clear, systematic teacher from the past. This was like having a glass of clear water. We also remembered and liked the radical--the one who jarred us."

She also sees a need for an atmosphere conducive to a teacher's saying, "I don't know about that." "In the university it's all right to say to one's colleagues, 'I need to retool.' There it's okay not to know everything." She believes that schools need to provide the opportunities to voice the need and to do the retooling. It requires not only time and money, but also even more importantly societal permission. She says she likes to keep these two constraints separate "since time and money are a factor everywhere, even in the universities."

In explaining his concern that higher order thinking and even the idea of educational reform itself might be a rather short-sighted solution to a problem which has enormous proportions, Apple paraphrases Jonathan Kozol's Savage Inequalities. "There's a lovely quote from Jonathan Kozol's book, and he says something like this. 'Look the affluent in this society have been able somehow to pathologically distance themselves from the realities of society, so that you can actually walk over the homeless on your way to school.' "

The problems of inequality in the larger society concern Apple, and he sees them reflected in the school setting. "When I've done research in the inner city schools, we find out that the curriculum and forms of pedagogy and evaluation that dominate inner city African

American schools tend to be drill and practice types of things where students' cultures are considered inferior and in fact deviant, so if a child says, 'I be going somewhere,' or 'this be a banana,'... he is given negative reinforcement. Their language and their culture is considered not as good as other cultures, and that kind of pedagogy that goes on is feeding back to the teacher exactly what the teacher wanted to know. When you compare that to say the language arts or social studies instruction in the much more affluent sections in the same city, what you find is when the children make linguistic mistakes, you don't want to interfere with that because it might challenge the students' creativity.

"There is a 75% unemployment rate among youth in inner cities. There has not been in many of these communities a structure that allows fulltime paid work for two or three generations. We can document this in Detroit, New York, in Albuquerque. It's vicious and it's frightening. The assumption is that if we can get teachers to change their behavior, that all the problems of inequality, of lack of school achievement, etc. would be solved if somehow we could raise the level of teaching so we can get teachers to ask better questions and kids to give better answers. Now it is the case right now that there are severe economic crises in inner city schools. So when you have, in Detroit, as an example, in some schools three elementary school classrooms using one set of reading textbooks; where in New York you have schools that are held where they have classrooms in the hallways; where in some districts there is not enough money to keep the schools open the required 180 days a year, it is a sleight of hand to assume that focusing on the psychological characteristics of the discourse of students and teachers will have a major impact."

Newmann sees that as "beyond [the topic of] thinking," but he would agree with the validity of the goal. "This gets into what are your basic goals for education. I would certainly agree that thinking alone would not be sufficient in my educational philosophy. One of the books I mentioned to you, Education for Citizen Action,[authored by Newmann] was a reaction to the fact that we'd spent many years teaching kids to analyze public controversy in the classroom, but not really giving them any opportunity or any skills for acting on it in the real world. So I spent about ten or fifteen years working on ways to develop community-based curriculum that would

get kids out of the classroom, involved in volunteer service and involved in various projects in the community where theoretically they would begin to apply some of the knowledge they'd learned in the English and social studies classes to exert influence in the world at large. Coming out of social studies, I have a strong commitment to democratic citizenship and participation in a democratic society as a major goal of education."

Models of Higher Order Thinking

Around the country there are isolated instances of schools that are beginning to work to implement the goals the interview subjects so eloquently describe. Sizer points out that they are the exception, not the rule, but they do present hope that in the future schools in which student are actively engaged in their own learning geared to real life situations could become the norm.

Capital High School in Santa Fe, New Mexico, has been involved in Re:Learning, a national project jointly sponsored by the Coalition of Essential Schools and the Education Commission of the States, since it opened its doors in 1988. A principal with a vision of making school meaningful for kids, carefully chose a faculty that was open to change and saw the need for it. It was not all smooth and easy, but the school has made progress toward a curriculum which challenges and engages students. Teachers work to maintain intellectual rigor. When the first principal left to be a superintendent in a neighboring district, careful consideration was given to hiring a the new principal who would assure that Capital High could maintain its impetus for restructuring.

Capital's Gateways program is group of social studies/English/humanities block classes composed of a heterogenous mix of all students in grades nine through eleven. The classes are taught from a thematic approach using essential questions to drive the curricula. Since students in New Mexico high schools must take U.S History, world history and government/economics during their high school years, the six themes consist of three world history and three U.S.

history year-long courses of study. One of the U. S. themes is designated as a class in government and economics. Teachers in each block are scheduled with common preparation periods so that they may plan together.

Each Gateways theme has four teachers and approximately 200 students in two two-hour blocks. The back-to-back block scheduling gives those teachers the flexibility to set up the students' schedule for those two hours in any way that seems best suited for effective teaching and learning. Students in each block are given the essential question that will guide their study for the quarter at the beginning along with a rubric with which essays on the question written at the end of the quarter will be assessed. In addition to the essays, many of the themes require other forms of demonstration of mastery. For example the Power and Authority theme which fulfills the requirement for government and economics conducts a model congress during one quarter in which they are guided by an essential question that asks, "What are the decisions that affect our daily lives?" Students must research and write their own bills, debate them in committee and testify for the bills of their classmates. Bills which pass or fail are posted outside the classrooms, and the whole process culminates in a mock joint session in which the bills which passed through committee are presented and passed or failed by the entire congress. The in-depth activity teaches parliamentary procedure, an understanding of the political process, and the art of rhetoric. It also causes thinking on the higher levels, since students work on their own to write and structure arguments for their bills. Textbooks are only reference books in this class according to Pat Rodriguez, one of the two coordinators of the Gateways program.

Students in the U.S. history theme called Life and Reality in America study U. S. history from a sociological/family history slant. During one quarter they work around an essential question which asks how we have changed or are changing situations in which there is injustice. The students identify social movements which interest them and, in groups of five or six, write their own essential questions for the groups. Each student then writes an individual question for a part of the the large topic, and does individual research and writes a paper on his or her topic. The demonstration of mastery occurs in a two-day rally in which devotees of the various

movements make speeches, and campaign for their causes with banners, buttons, pamphlets and tracts and hear the concerns of the movements of their classmates. Before the rallies each group must synthesize the information from all the group members and work together on the pamphlets, banners and brochures. They write the speeches as groups, using ideas from the research of the various members. Textbooks are rarely opened during this quarter, although each student must read a book, often biography or autobiography, which is related to the social movement. There is field trip to the public library, and the media resource center at the school is scheduled for a number of days of work for the students.

At Horizon High School in Thornton, Colorado, all sophomores enroll in interdisciplinary, heterogenously grouped classes called the Core which include social studies, English and science. When the Core program was begun by teachers at the school four years ago, "there was a conscious effort to make it not just a class in skills," says Johnson, who has served as the program coordinator for the past two years. Another goal of the program has been to make the classes more fully integrated than in ordinary multidisciplinary team teaching situations. The three teachers in a Core block share the same students for a three period block, and all the students are one one roll sheet. The teachers plan and work together to make each thematic unit fully integrated. The flexible schedule allows them to structure the time as they believe it will be best used to help students see the connections between the disciplines in each unit. The general themes around which the units are organized include topics like Change, Diversity, Patterns, Perspectives and Problem Solving.

Johnson uses the unit on Change to illustrate how the curriculum is developed. The history portion might include a study of the 60's and changes in the policitcal structure. For the English part of the Core, where writing and American literature is the emphasis, students would read the literature of the times. In science students might be looking at evolution and the environment. . All the topics would be integrated around the theme of "Change," and there might be 25 or 30 essential questions guiding the curriculum.

At the beginning of each unit teachers create a rubric for assessment, asking themselves, "What are the kids going to do to show us what they know." Johnson explains, "Students are told, 'At the end of this unit you will present this or that to show us what you have learned.' " Examples of the kinds of things they might do include newspapers as they would have appeared in a particular time in history; a radio show that students write and produce themselves; a demonstration or presentation of scientific concepts such as the space program or robotics as they might have looked at a particular time compared with the same idea now. "You can't think about higher order thinking without having something to think about," says Johnson, explaining that teachers at Horizon High believe higher order thinking is content-specific.

Pedagogy includes many hands-on activities including cooperative learning structures such as the jigsaw in which students become experts in one aspect of their topic and then teach other students in their home groups about their topic of expertise. "We never just read," says Johnson. All the teachers emphasize the importance of writing.

The Core program for sophomores has been so successful that other teachers in other disciplines and at other grade levels are beginning to develop similar plans. Physical education, health and home economics are planning an integrated class and many of the juniors will continue with an interdisciplinary class combining world history and literature. Physics and mathematics classes are also working on integrating material at Horizon. "The key [for the program's success] has been in teaming teachers, says Johnson.

"We're beginning to have good data," she continues. Science scores are up for Horizon students, 'because more kids are taking science." She adds that this is especially true for kids who might have once been labeled as "lower level." Gifted projects are available for any student at Horizon. "We define gifted as interested," Johnson explains.

Capital High School and Horizon High Schools are just two examples of schools where teachers have begun to talk about and move toward making meaningful change. In both of these sample cases, the change has assumed a systemic nature. As curricular changes have been made, policy changes and role changes have also occurred. Barriers have been overcome and

the conversation about how teaching and learning can best be accomplished has increased in depth and in significance.

Conclusion

The rich variety of ideas of the educators interviewed for the paper gives much substantive material for consideration by practitioners in the schools. While teachers in the beginning stages of changing to a more thought-provoking curriculum can be caught up in the euphoria of having students who are more engaged in the material in classes than when things were very traditional, and while they can bask in the pleasure of seeing students who might have been potential failures blossom in an environment of high expectations, there are certain checks that all educators must be careful to observe.

The concern that higher order thinking in our classrooms should be more than just a set of skills is a legitimate one. We must learn how to assure that we are truly structuring our curricula around deep and meaningful questions within our disciplines as well as across disciplines where it is appropriate. We must maintain the rigor of AP classes for all our students whether we work in situations where students have been untracked and grouped heterogeneously or in schools which still have tracked classes. Bloom's Taxonomy gives us a useful vocabulary, but as Dr. Newmann pointed out, it is not a rubric for predetermining the thinking level of a particular question or activity. Higher order thinking occurs when we carefully plan to provide opportunities and ask questions that are so open-ended and thought-provoking that students have to ask more questions of their own.

Our classrooms may look very different from traditional classrooms sometimes, and at other times they may not. There is a place for lecture and almost any other pedagogical skill in a classroom where higher order thinking is occurring, and no particular pedagogy is the answer to all the problems of helping our students make their own meaning from the classes we coach. We need to remember that reform which changes only procedures and not the depth of the

conversations in classrooms is only superficial. Our students' minds, which they have the right to use well, and their engagement and involvement in their own learning must be a priority. Further, it is crucial that we help students see the connections between what happens in school and what happens in life.

Dr. Apple's idea that real-world application of what students are thinking about is the true test of the worth and of the depth, or height as the case may be, should guide our planning and our conversations with colleagues and with students. We must work to provide opportunities, as in the case of senior projects, mentorships and apprenticeships, for our students to make applications of their knowledge.

Educators can not make changes without the support of policy makers and policy administrators. Among the issues mentioned as having implications for policy were those of alternative assessment and the schedule, particularly in secondary schools. Demands on teachers' time and the way teachers are trained, both in-service and pre-service, are deserving of careful consideration by those who have the power to change them. The often superficial coverage of a prescribed amount of material as contrasted with in-depth study of critical issues is sometimes a matter of policy having been set by legislatures, boards of education or state departments of education. This issue, too, merits a close look. The work load asked of teachers is often staggeringly heavy according to some of the educators interviewed. The subsequent "de-skilling" which Apple sees as inevitable can only lead to less opportunity for higher order thinking in their classrooms. Closely related to the myriad of tasks which teachers are asked to undertake by the society they serve is the issue of the number of students they see each day. The honoring of teachers' particular styles and talents is often neglected in a system which provides little incentive for being creative or innovative. Finally, the issue of the inequalities of society being replicated in the schools is an issue that can not be ignored. We must not perpetuate those "savage inequalities" which Kozol has written about. Schools need help from policy makers in order to become places where all children can learn to use their minds well.

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